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POSSIBLE CAUSES OF DIFFERENCES IN TEST RESULTS BETWEEN AMERICAN AND EUROPEAN SEED TESTING STATIONS

By

O. L. JUSTICE, Seed Technologist

Seed Branch, Grain Division, Agricultural Marketing Service
U.S. Department of Agriculture 1/

During the periods of May 22-31 and June 17-July 2 the writer visited seed testing stations at Wageningen, The Netherlands; Zurich, Switzerland; Paris, France; Hamburg, Germany; Copenhagen, Denmark; and Stockholm, Sweden; and some seed firms in Southern Sweden. The principal objective in making these visits was to attempt to find causes for variations in test results that have existed from time to time among certain American and European laboratories. The following remarks are based on impressions gained during these visits.

SAMPLING

In most European stations the laboratory working sample was obtained by some type of hand mixing procedure; whereas, the American laboratories use mechanical devices in practically all cases. We feel that the mechanical mixers eliminate bias and are otherwise superior to hand mixing procedures.

In discussing the matter of uniformity of seed lots the writer drew the

1/ Dr. Justice went to Europe as an official delegate of the U.S. Department of Agriculture at the triennial meeting of the International Seed Testing Association in Paris in June, 1956. The Department's Foreign Agricultural Service helped arrange for visits by Dr. Justice to several import European seed laboratories at times enabling him to study critically their methods and practices. Most of the laboratories prepared samples that might be carefully studied. Dr. Justice has made this report as result of his observations.

conclusion that very little effort is being made in Europe to insure that the seed lot is uniform throughout. One or two countries do limit the size of seed lots for which orange International Certificates are issued in an effort to encourage uniformity. While some United States firms are attempting to blend seed, and U.S. Department of Agriculture is studying the problem, the situation appears to be little better in this country.

PURITY ANALYSIS

In some European stations binocular microscopes were not immediately available for use in identifying weed seeds and the small grass seeds. We believe such equipment absolutely necessary.

In instances where weed seeds and crop seeds were observed, our interpretations and identifications were in good agreement. It was observed that in a few instances there were differences in the interpretation of some crop and weed seeds due to the fact that the European stations follow the International Rules for Seed Testing which are different in some details from the American rules.

Examples of these differences in the American and International rules include the definition of pure seed in the grasses, definition of weed seeds versus inert matter for quackgrass (Agropyron repens), and the method of classifying multiple florets of orchard grass (Dactylis glomerata). In cases where these differences existed they would not cause any difficulty in regard to the importation of seed into the United States.

The extent of variety testing carried out in the Scandinavian countries visited were impressive.

GERMINATION

Equipment: Most European stations make considerable use of the Copenhagen apparatus, whereas, the principal germinator in the United States is the germination chamber or cabinet. It is probable that some differences in seedling interpretation can result from the use of different equipment.

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International trade in seeds is influenced to a considerable extent by the regulations and controls of governments. Some of these controls are based on the seed analysis reports issued by Government seed laboratories. Considerable inconvenience and monetary loss can arise from variations in test results reported by laboratories in the importing and exporting countries.

Some countries prohibit the importation of seed falling below minimum standards of purity and germination. Others attempt to limit the imports of seed infested with certain seeds of noxious weeds. Buyers and sellers, however, look upon the germination and purity percentages as evidence of the value of the seed. Thus, the government of the importing country, the purchaser, and the seller are vitally interested in the laboratory tests.

Seedlings grown in the Copenhagen apparatus are usually shorter, possess chlorophyll and have different appearing roots than those grown between blotters or folded towels in dark chambers. At times, the writer found it difficult to classify certain seedlings grown in the Copenhagen apparatus. This was perhaps due to his unfamiliarity with seedlings grown under these conditions. While the moisture is controlled in the Copenhagen apparatus and light is provided, there is question as to whether the old-type Copenhagen germinators provide the specified temperature at the position of the seeds. The germination chamber is capable of maintaining a more exact temperature but moisture is not controlled so well, and light is not available.

Methods: Some laboratories used different temperatures in germinating certain kinds of seed than are used in the United States, although both temperatures are provided in the International Rules for Seed Testing.

One wonders whether differences may arise as a result of testing seeds at these different temperatures. Some laboratories use locally developed methods which are not widely accepted. By American standards the seeds were frequently crowded in germination tests. However, this may not be a serious weakness in the case of the Copenhagen apparatus since light tends to suppress the development of fungi. One laboratory removed the hard seeds of legumes at the time of the first count. No other laboratory observed by the writer follows this practice.

Seedling evaluation: In most cases the classification of seeds as normal and abnormal by the United States and the European stations, was quite consistent. However, two stations did seem to be quite lenient. One possible cause for differences in test results is the fact that most European stations count so closely on the preliminary count date. In our opinion, this practice results in removing some seedlings before the defects have had an opportunity to express themselves. If permitted to develop further, some of these seedlings might well be classified as abnormal. There appeared to be two reasons for counting the seedlings so closely on the preliminary count: (1) an effort to obtain an energy or vigor reading and (2) an effort to remove and discard as many seedlings as possible when cleaning the filter paper in Copenhagen apparatus tests, rather than to place the seeds on a second filter paper and allow them to

The International Seed Testing Association has advocated and promoted uniform results of laboratory tests for several years. It has prepared and distributed to member governmental laboratories rules for making uniform tests on various kinds of seeds. The Organization for European Economic Co-operation sponsored a school in 1954 at Cambridge, England, for the heads of laboratories to promote greater uniformity in test results. Considerable success has been achieved, but in spite of this, there are still occasional variations in test results which plague the seedsman and interfere with orderly international trade.

The Seed Branch, Grain Division, Agricultural Marketing Service, is charged with the responsibility of administering the Federal Seed Act which covers imported seed. The U.S. Federal laboratories test agricultural and vegetable seeds offered for importation to determine whether the seed meets the minimum requirements established by the act and the rules and regulations thereunder.

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develop further. The practice of transferring seedlings appeared to be hazardous since it is quite possible that injury will result therefrom. Only in rare instances are seedlings transferred in American laboratories.

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Naturally, differences in results of tests on the same seed lot arise from time to time. In such instances the Seed Branch is willing to retest, and make comparative tests with foreign laboratories, to determine the correct results and causes of differences in results. Besides making additional tests, entire seed lots are occasionally resampled. The Federal laboratories have found foreign laboratories very cooperative in making comparative tests in an effort to reduce these differences in test results.

The arbitration of differences between buyer and seller would have to be arranged by the interested parties. In other words, they would have to agree upon a laboratory whose results would be acceptable to all parties in disagreement.

To facilitate the movement of seeds in international commerce, the Federal laboratories conduct tests on samples representing seed intended either for importation into, or exportation from, the United States. These tests are made in accordance with the rules adopted by the International Seed Testing Association and certificates patterned after the so-called International Analysis Certificate are issued. ----- W. H. Youngman, Seed Marketing Specialist, Foreign Agricultural Service.